CLAIMS

Having thus described the aforementioned invention, we claim:

1. A method for producing a high resolution detector array, said method comprising the steps:

cutting a first selected number of bars of scintillator material to a selected dimension;

polishing said selected number of bars;

coating said polished bars with an adhesive of a selected index of refraction;

laminating said polished bars together, wherein a thin reflective optical film is disposed between adjoining scintillator bars, wherein said optical film defines a reflector, whereby an assembly of laminated bars having a layer of said optical film between adjoining bars is formed;

allowing said laminated assembly to cure;

cutting a second group of said selected number of bars from said laminated assembly, wherein said cut is perpendicular to said polished bars, whereby each of said second group of cut bars comprises a laminated composite of said selected number of scintillator elements having a reflector interposed between adjoining scintillator crystals;

polishing said second group of said cut bars;

coating said second group of polished bars with said adhesive of said selected index of refraction;

laminating a second selected number of said second group of polished bars together, wherein a thin reflective optical film is disposed between adjoining scintillator bars, wherein said thin optical film defines a reflector, whereby a detector array of discrete scintillator crystals having a reflector disposed between adjoining discrete scintillator elements is formed.

2. The method of claim 1 wherein each of said selected number of bars is cut from a single scintillator material.

3. The method of claim 1 wherein said first selected number of bars is equal to said second selected number of said second group of polished bars.

4. The method of claim 2 wherein said single scintillator material comprises a first layer having a first selected decay time optically bonded to a second layer having a second selected decay time.

5. The method of claim 1 wherein a first half of said first selected number of bars are cut from a scintillator material of a first selected decay time, and further wherein a second half of said first selected number of bars are cut from a scintillator material of a second selected decay time.

6. The method of claim 1 wherein a first half of said first selected number of bars are cut from a first scintillator material comprising a first layer having a first selected decay time optically bonded to a second layer having a second selected decay time, and further wherein a second half of said first selected number of bars are cut from a second scintillator material comprising a first layer having a first selected decay time optically bonded to a second layer having a second selected decay time.

7. The method of claim 1 wherein said steps of polishing are carried out by chemically etching said selected number of bars.

8. The method of claim 1 wherein said steps of polishing are carried out by mechanical polishing.

9. The method of Claim 1 wherein said adhesive of a selected index of refraction is selected from a group consisting of epoxies, silicon based adhesives and silicon based encapsulants.

10. The method of claim 1 wherein said adhesive is selected from a group consisting of Epotek 301-2, Sylgard 186, Sylgard 184, GE 656 and GE 615.

11. The method of claim 5 wherein said step of laminating said polished bars together is carried out such that a bar of said scintillator of said first selected decay time

adjoins a bar of scintillator material of said second decay time whereby bars of different decay times are laminated together in an alternating pattern.

12. The method of claim 1 wherein said optical film is loaded with a reflective material selected from a group consisting of $BaSO_4$, MgO, SiO_2, powdered Teflon, $CaC0_3$ and $Ti0_2$.

13. The method of claim 11 wherein said step of laminating said second group of polished bars together is carried out such that a checkerboard pattern of alternating scintillation crystals of different decay times is formed.

14. The method of claim 1 wherein said optical film is a mono-layer film.

15. The method of claim 1 wherein said optical film is a multi-layer film.

16. The method of claim 1 wherein said optical film is selected from a group consisting of polyester film and polyethylene film.

17. A method for producing a high resolution detector array, said method comprising the steps:

cutting a first selected number of bars of scintillator material to a selected dimension, wherein a first half of said selected number of bars are cut from a scintillator material of a first selected decay time, and further wherein a second half of said selected number of bars are cut from a scintillator material of a second selected decay time;

polishing said selected number of bars;

coating said polished bars with an adhesive of a selected index of refraction;

laminating said polished bars together such that a bar of said scintillator of said first selected decay time adjoins a bar of scintillator material of said second decay time whereby bars of different decay times are laminated together in an alternating pattern, wherein a thin polyethylene optical film is disposed between adjoining scintillator bars, wherein said optical

film defines a reflector, whereby an assembly of laminated bars having a layer of said optical film between adjoining bars is formed;

allowing said laminated assembly to cure;

cutting a second group of said selected number of bars from said laminated assembly, wherein said cut is perpendicular to said polished bars, whereby each of said second group of cut bars comprises a laminated composite of said selected number of scintillator elements having a reflector interposed between adjoining scintillator crystals;

polishing said second group of said cut bars;

coating said second group of polished bars with said adhesive of said selected index of refraction;

laminating a second selected number of said second group of polished bars together, wherein a thin polyethylene film is disposed between adjoining scintillator bars, wherein said thin optical film defines a reflector, wherein said step of laminating said second group of polished bars together is carried out such that a checkerboard pattern of alternating scintillation crystals of different decay times is formed, whereby a detector array of discrete scintillator crystals having a reflector disposed between adjoining discrete scintillator elements is formed.

18. The method of claim 17 wherein said first selected number of bars is equal to said second selected number of said second group of polished bars.

19. The method of claim 17 wherein said single scintillator material comprises a first layer having a first selected decay time optically bonded to a second layer having a second selected decay time.

20. The method of claim 17 wherein a first half of said first selected number of bars are cut from a first scintillator material comprising a first layer having a first selected decay time optically bonded to a second layer having a second selected decay time, and further wherein a second half of said first selected number of bars are cut from a second scintillator material comprising a first layer having a first selected decay time optically bonded to a second layer having a second selected decay time.

21. The method of claim 17 wherein said steps of polishing are carried out by chemically etching said selected number of bars.

22. The method of claim 17 wherein said steps of polishing are carried out by mechanical polishing.

23. The method of Claim 17 wherein said adhesive of a selected index of refraction is selected from a group consisting of epoxies, silicon based adhesives and silicon based encapsulants.

24. The method of claim 17 wherein said adhesive is selected from a group consisting of Epotek 301-2, Sylgard 186, Sylgard 184, GE 656 and GE 615.

25. The method of claim 17 wherein said optical film is loaded with a reflective material selected from a group consisting of $BaSO_4$, MgO, SiO_2, powdered Teflon, $CaC0_3$ and $Ti0_2$.